

A NEW GENUS AND SPECIES OF ENTOMOBRYIDAE (COLLEMBOLA, ENTOMOBRYOMORPHA) FROM THE IBERIAN PENINSULA

Enrique Baquero,¹ Maite Martínez,² Kenneth Christiansen,³ and Rafael Jordana²

ABSTRACT: A new genus and species, *Hispanobrya barrancoi* Jordana and Baquero, gen. n., sp. n. is described. It was found in the Gador Mountain range (Almería, Spain). This genus is similar to *Capbrya* Barra, 1999, from South Africa. The distinguishing characteristics of the new genus are the presence of a post-antennal organ (PAO), no clear tenent hair, a characteristic unguis, the presence of a reduced trochanteral organ, and flattened body setae. The distribution of the bothriotricha is similar to that of the genus *Capbrya*.

KEY WORDS: Collembola, Entomobryomorpha, Entomobryidae, *Hispanobrya* gen. n., Spain, Iberian Peninsula

Specimens of an undescribed collembolan with characteristics of both the families Entomobryidae and Isotomidae were found during a study of the cave fauna of Almería (south of Iberian Peninsula). Their habitus, length of abdominal segments III and IV, presence of PAO led to an initial identification as *Isotomurus*. Detailed study, including SEM (Scanning Electron Microscopy) observation, allowed us to see characters not visible under the light microscope. These details included the eye fine structure, claw, unguiculus, and body sculpture. As a result of this study it became clear that these specimens were a new genus similar to the genus *Capbrya* Barra, 1999, from South Africa.

METHODS

The specimens were collected in the "Paraje Natural Karst en Yesos de Sorbas" in Almería, Spain. The plant community of the "Paraje Natural Karst en Yesos de Sorbas" is gypsophilous and is dominated by small bushes of *Thymus* spp. (thyme, Lamiaceae). There are few other plants near these. In the more open regions, where the thyme is less dense, there is a scattering of annual plants (Lázaro, 1986). The remaining soil is covered mainly by lichens, which cover about 90 percent of the gypsum surface. The predominant lichen community is *Heliantemo alypoidis-Gypsophiletum struthii* (Rivas-Goday and Esteve, 1965).

Samples were taken in the spring, summer and autumn, but *Hispanobrya* gen. n. was found only in the spring and summer. Specimens were preserved in 70 percent ethanol. Some specimens were mounted on slides using 'Hoyer medium,' whereas others were dehydrated using an ethanol series followed by critical-point drying in CO₂, mounted on aluminum SEM stubs, and coated in Argon

¹Received on August 4, 2004. Accepted on October 20, 2004.

²Department of Zoology and Exology, University of Navarra, P. O. Box 177, 31080 Pamplona, Navarra, Spain. Corresponding author: Enrique Baquero, ebaquero@unav.es. Maite Martínez, mmartin4@alumni.unav.es; Rafael Jordana, rjordana@unav.es.

³Grinnell college, Grinnell, Iowa 50112 U.S.A. christak@grinnell.edu.

atmosphere with 16 nm of gold in an Emitech K550 sputter-coater. SEM observations were made in a Zeiss DSM 940 A. Abbreviations: MZNA, Museum of Zoology, University of Navarra.

In addition to direct capture, specimens were captured with two types of pit-fall traps. One, containing a solution of water and chloral hydrate (10g/l), was collected after 24 hours. A second type had a mesh and 200 g of sheep/goat manure without preservative. The specimens in these traps were collected directly after 48 hours, with an ethanol wetted paintbrush.

Hispanobrya Jordana and Baquero, NEW GENUS

Diagnosis: Body without scales. Abdominal tergite IV 1.72 times as long as abdominal tergite III (1.6-1.9; n=6). First antennal segment undivided, fourth antennal segment with apical vesicle but without a laminar projection. 7+7 ommatidia with reticulated cornea, and a very poor developed 8th ommatidium. Its cornea are almost invisible with the SEM, but the ommatidium lens is barely visible under light microscopy. The PAO is in the form of a protruding vesicle with a perforated cavity on top (Fig. 1A). There are no clear tenent hairs on legs. A reduced trochanteral organ is present in leg III. The formula of trichobothria is 2, 3, 2 on abdominal tergites II, III and IV.

Type species. *Hispanobrya barrancoi* sp. n. Jordana and Baquero.

Etymology. The generic name refers to the geographical region (Hispania, Latin for the Iberian Peninsula).

***Hispanobrya barrancoi* Jordana and Baquero, NEW SPECIES**

(Figs. 1-4)

Description. Total length without appendages 0.7-1.0 mm (n=20) (holotype, 0.95 mm) (Fig. 1B). Background color whitish, with some pigment on head and antennae, and bands covering most of the tergites of all segments. Under SEM the body presents a very uniform reticular pattern, consisting of large hexagonal cells with primary tubercles at the corners (Fig. 1A,C).

Antennae longer than head (holotype antenna/head ratio 2.2). Length of antennae segments (holotype): 0.07:0.11:0.12:0.14 (Fig. 3A,B). Antennal segments II and III similar in length. Antenna with abundant sensillae (about 50) of three types: 1) short, cylindrical, blunt and smooth; 2) long (two times the preceding) and smooth (Fig. 1C); 3) longer and serrated asymmetrically. Antennae segment IV with extrusible apical vesicle but without laminar projection. Antennae segment III with fewer sensory setae than segment IV, and an apical organ with two leaf-like perforate sensory organs (Fig. 3C). Antennal segment II with fewer sensillae than III. Antennal segment I with two basal sensillae on dorsal side, and five basal sensillae on ventral side.

Head. The PAO is a protruding vesicle (20 x 10 micra in a Paratype) with a perforated cavity on top (11.5 x 6.9 micra), situated in front of the eyes A and B. Under SEM the cavity of the PAO shows perforations (Fig. 1A), and 7+7 reticulated ommatidia can be observed. The G ommatidia cannot be seen under the SEM, but a small lens can be seen under the light microscope. A large number of macrosetae of different sizes present (Fig. 4B). The bothriotrichum beside the eyes is present. Labrum with 554 setae (Fig. 4C). Labral papillae smooth with an anterior row of short blunt setae. The remaining labral setae are smooth and acuminate, the five prelabrals setae ciliated. The labial setae drawn appear like a typical entomobryid labial triangle with the M1, M2, R, E, L1 and L2 setae, all similar and ciliate, and seta a2 smooth present (Fig. 4B). Labial palps with five basal setae (Fig. 4D); the external differentiated papilla has a blunt, thickened seta. Venter of head with mesosetae of varied sizes.

Body chaetotaxy. Microsensillae: 10/1000. Sensillae: 12/02223, thoracic ones lateral but those of

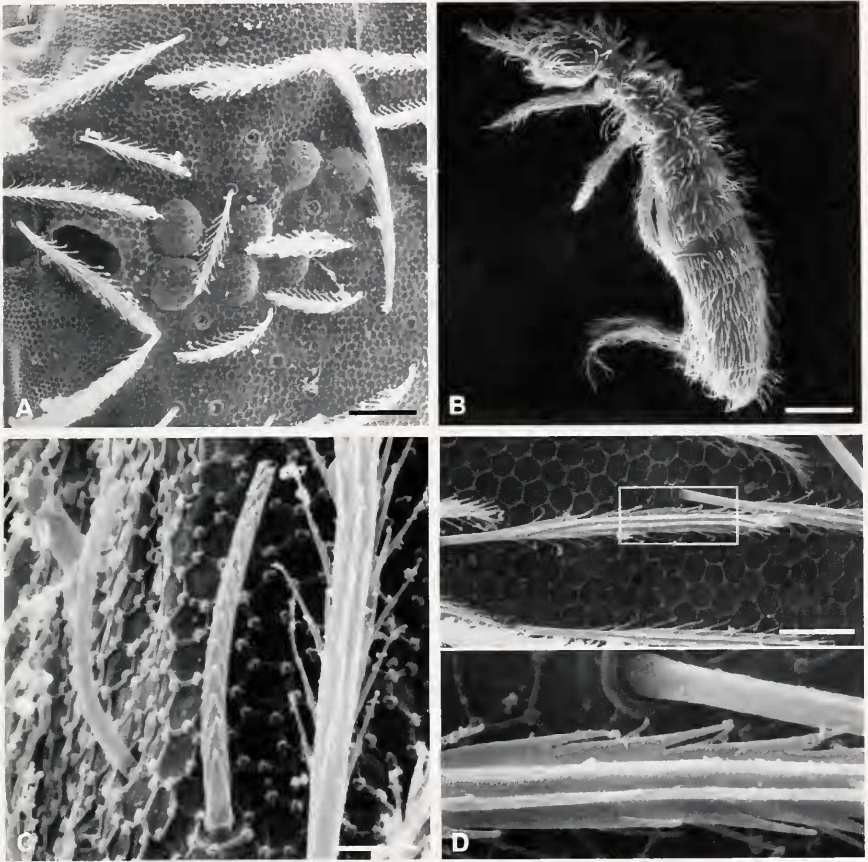


Fig. 1. *Hispanobrya barrancoi* (SEM microphotographs). A, Detail of the eyes and PAO (bar = 10 micra). B, Lateral habitus (bar = 100 micra). C, Two types of sensillae present on the antennal segment IV, one of them smooth and the other with peculiar spine-like projections, very difficult to see under light microscope (bar = 2 micra). D, Mesosetae and detail (x4) (bar = 5 micra).

abdominal segments III and IV posterior and in front of the last row of setae, and in abdominal segment V with the anterior sensillae three times as long as the posterior. Pseudopores on thoracic and abdominal segments I-IV. Bothriotricha on abdominal segments II-IV (2/3/2) (Fig. 2C,4A). There are 3+3 pubescent setae (type 2 from Christiansen, 1958) on abdominal segment IV similar to the bothriotricha but thicker. Macrosetae similar to the *Entomobrya* type 1 setae occur on the thorax and abdomen but are somewhat different in appearance from those seen in the genus *Entomobrya* (Fig. 1D,3L). The rest of setae are more flattened with 6-8 rows of barbed ridges; the basal barbs project out laterally more than the distance of the seta width. This type of setae are 19-46 micra long. Macrosetae present on head, thoracic segments and abdominal segment I (Fig. 2A,4A). Mesosetae on abdominal segments II-VI (Fig. 2B) and on legs up to 25 micra long. Trochanteral organ on leg III has four smooth setae (Fig. 3D,E). On the leg III there is a smooth and long inner seta. Pretarsus with a single anterior seta. The unguis (Fig. 3F-J) with three longitudinal ridges extended beyond the level of the basal teeth, with the central ridge longer than the others, inner lamellae joined basal to apex forming the apical tooth. Between the basal paired teeth and the anteapical teeth there is an unpaired

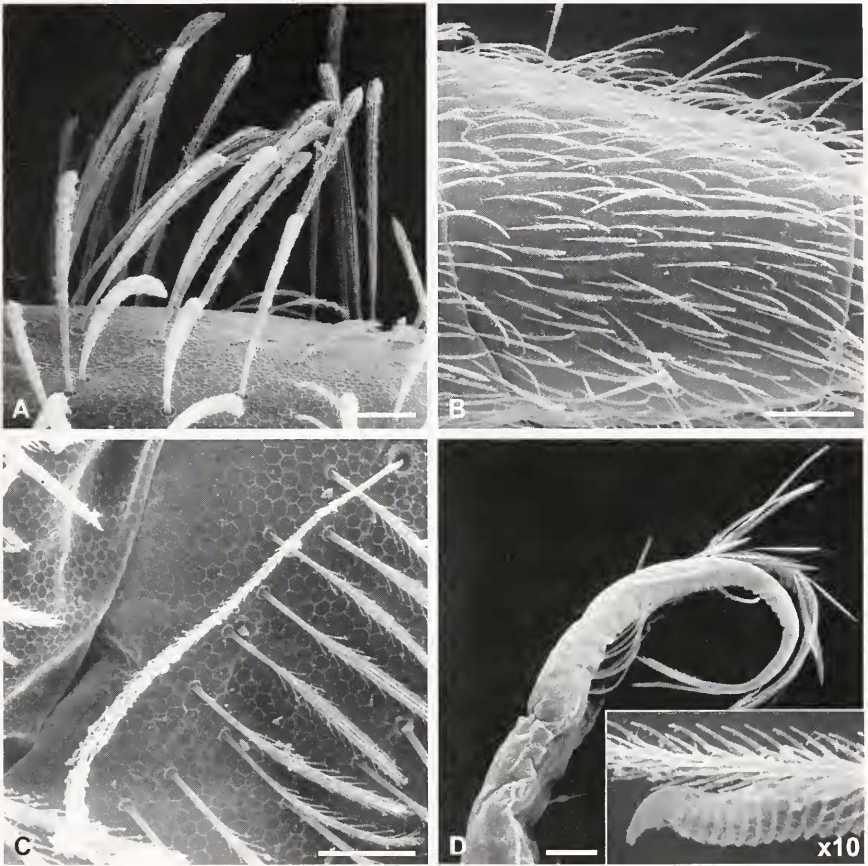


Fig. 2. *Hispanobrya barrancoi* (SEM microphotographs). A, Macrosetae on the thoracic segment II (bar = 10 micra). B, Lateral view of abdominal segment IV (bar = 30 micra). C, Bothriotrichum on abdominal segment II. (bar = 5 micra). D, Lateral view of the furcula and detail of the mucro (inset x10) (bar = 20 micra).

tooth. The unguiculus is half as long as the unguis, and has two short lateral wings but no terminal filament. The four lamellae have a strong ridge. The lateral flaps of the ventral tube each have eight apical setae, only one being smooth, anteriorly with 1+1 setae, and no posterior setae (Fig. 3K).

Tenaculum with four teeth on each ramus, and a single seta on the corpus (Fig. 3M).

Furca. Manubrium with setae similar to those on the legs, manubrial plaque with two pseudopores, two inner setae and one outer seta (Fig. 3N). *Dentes* ringed on its basal two thirds (Fig. 2D), with the final third narrowed and striated transversally, and with three subapical setae that reach the apex of the mucro, which is falciform and without basal spine.

Type Material. Holotype. Female, SPAIN, "Paraje Natural Karst en Yesos de Sorbas," Almería, 300 m (UTM co-ordinates 30SWG8308), Mediterranean maquia, 28 June 2002, Ruiz-Portero (pitfall trap) code: MZAL0164-02p (slide) (MZNA). **Paratypes.** Same data as for holotype, MZAL0164-02 (6 specimens in ethyl alcohol), MZAL0164-04p (slide) and MZAL0164-03, 05, 06 (3 specimens on 2 SEM stubs) (MZNA).

Other material studied. Same locality as for holotype, MZAL0150-03p (1 specimen on slide), 9 August 2002 (direct capture and pitfall trap); MZAL0151-02t (1 specimen in ethyl alcohol), 7 August

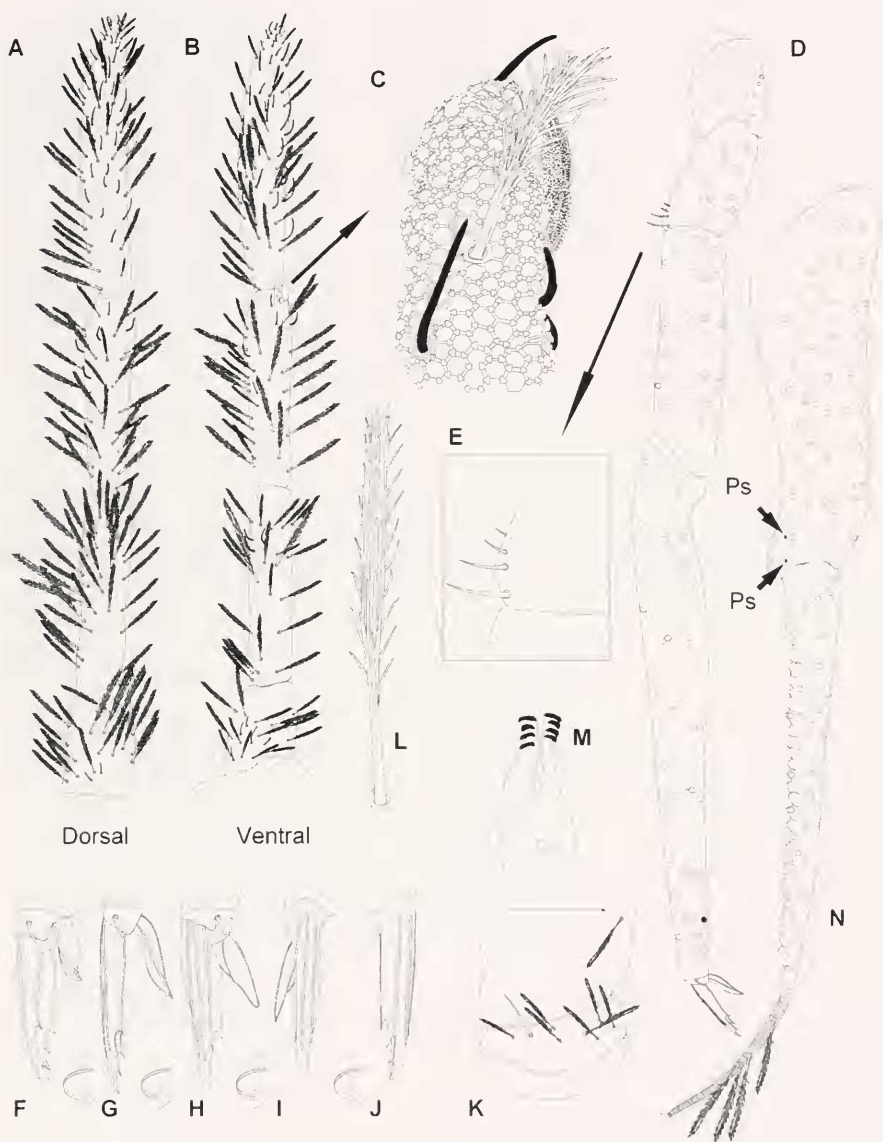


Fig. 3. *Hispanobrya barrancoi*. A, Antennae dorsal view. B, Antennae ventral view. C, Detail of the sensory organ of antennal segment III. D, Leg III. E, Trochanteral organ. F-J, Claw rotation to show its structure. K, Ventral tube (collophore). The arrow points to the head. L, Detail of a mesosetae (type IV, Christiansen, 1958) from the body. M, Tenaculum. N, Furcula.

2002, (direct capture and pitfall trap); MZAL0152-02t (1 specimen in ethyl alcohol), 14 June 2002 (direct capture and pitfall trap); MZAL0153-03t (1 specimen in ethyl alcohol), 26 June 2002 (direct capture and pitfall trap); MZAL0154-03t (1 specimen in ethyl alcohol), 17 May 2002 (direct capture and pitfall trap); MZAL0161-03t (2 specimens in ethyl alcohol), 31 May 2002 (direct capture and pitfall trap); MZAL0162-03t (4 specimens in ethyl alcohol), 27 August 2002 (direct capture); MZAL0163-03t (1 specimen in ethyl alcohol), 6 May 2002 (direct capture and pitfall trap) Ruiz-Portero (all MZNA).

Etymology. The name is dedicated to Dr. Pablo Barranco, who kindly provided the material.

DISCUSSION

Capbrya Barra from South Africa is the genus most similar to *Hispanobrya*. *Hispanobrya* is similar to *Capbrya* in habitus, the falciform mucro, the dentes without spines, crenulated with the final third striated transversally, the number and position of the bothriotricha and type 2 setae on abdominal segment IV, the ratio between abdominal tergites III and IV, the general chaetotaxy and absence of a clear tenent hair. It differs in claw morphology, the sensory organ on antennal segment III, the eye number, and the PAO. The lack of SEM figures for the antennae of *Capbrya* makes comparison of the sensory setae difficult.

Nothobrya Arlé, 1961 is similar in size and habitus, but has a vesicular PAO and six segmented antennae (Baquero et al., 2004). The setae morphology and distribution are also different.

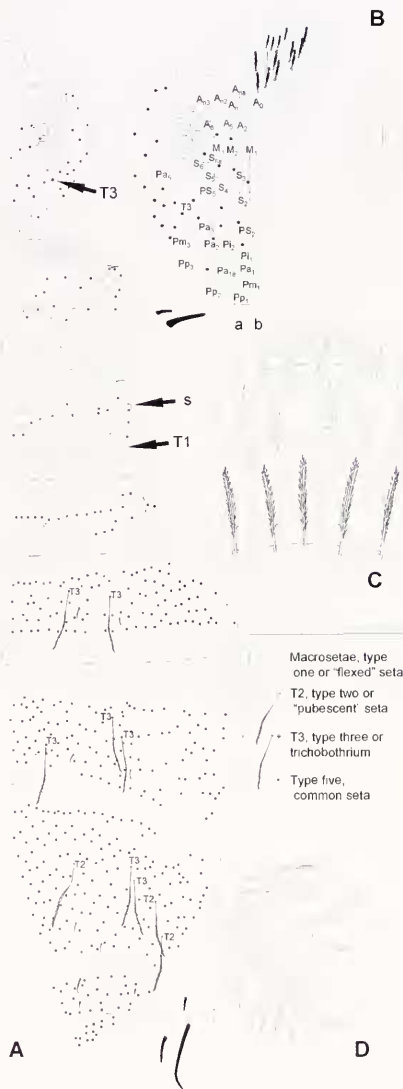


Fig. 4. *Hispanobrya barrancoi*. A, Body dorsal chaetotaxy. B, Dorsal (a) and ventral (b) head chaetotaxy. C, Labrum. D, Labial papillae.

The presence of PAO of *Hispanobrya* Jordana and Baquero, gen. n., *Capbrya* and *Nothobrya* is similar to *Indoscopus* Prabhoo, 1971, at least one species of *Alloscopus* Börner, 1906 and *Australotomurus* Stach, 1947; however, the other features of *Hispanobrya* are totally unlike those found in these genera. The PAO is also found in some genera of Tomocerinae. The presence of type 1 setae, the trochanteral organ on leg III and the 2- 3- 2 arrangement of bothriotricha on abdominal segments II-IV, as well as the habitus indicate that all three genera belong in the family Entomobryidae *sensu lato*, but the chaetotaxy, the detailed structure of the setae and the unusual features of the unguis in *Hispanobrya* does not fit into any subfamily as they are presently defined.

These discoveries raise two important questions: 1) what does the discovery of these two genera in two such disparate localities imply and 2) what is the impact of this upon the suprageneric classification of the Entomobryidae *sensu lato*.

ACKNOWLEDGEMENTS

We are grateful to Dr. Pablo Barranco (Department of Applied Biology, University of Almería) for the material object of the study. Stephanie Peterson assisted in the preparation of the manuscript.

LITERATURE CITED

- Baquero, E., R. Jordana, and K. Christiansen. 2004. Redescription of *Nothobrya schubarti* Arlé, 1961 (Collembola, Entomobryomorpha). *Entomological News* 115: 31-34.
- Barra, J.-A. 1999. Un nouveau genre *Capbrya* avec deux nouvelles espèces de la Province du Cap (Rép. Sud Africaine) (Collembola: Entomobryidae). *Bulletin de l'Institut Royal Des Sciences Naturelles de Belgique* 69: 19-24.
- Christiansen, K. A. 1958. The Nearctic members of the genus *Entomobrya* (Collembola). *Bulletin of the Museum of Comparative Zoology, Harvard* 118: 440-545.
- Lázaro, R. 1986. Sobre la flora y vegetación gipsícola almeriense (Fanerógamas). *Boletín del Instituto de Estudios Almerienses* 6: 131-150.
- Rivas-Goday, S. and F. Esteve. 1965. Nuevas comunidades de tomillares del sudeste árido ibérico. *Anales del Instituto Botánico AJ Cavanilles* 23: 7-78.